

WEATHER, FORECASTS, AND WARNINGS.

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During the first two days of the month pressure continued abnormally high over Alaska, with a crest of 30.78 inches and a temperature of 24° below zero at Tanana. This wave of high pressure spread to the eastward and southeastward over the United States and passed off the Atlantic coast on April 14. A low area appeared over Alaska on April 3, and pressure had already been low to the southward for several days. A series of depressions then moved across the United States, interrupted only by the building of a local high area about the middle of the month over the central portion of the country, and it was not until April 23 that the last of the disturbances moved off the banks of Newfoundland. From April 7 to 10, inclusive, pressure was again high over Alaska; and from April 15 to 20, inclusive, it was abnormally low, resulting in unsettled weather locally and an irregular movement to the southeastward after April 20 that by the end of the month had resolved itself into a well-marked disturbance over the central portion of the country, with warm and rainy weather to the eastward and southward and a strong and very cold high area to the northwestward, with some snow.

Over the Atlantic Ocean pressure was somewhat above normal as a rule, except during the first half of the month over the middle eastern latitudes and during the last week over the northern latitudes. Over the latter area pressure was quite low, with very stormy weather and severe gales.

Over northwestern Europe pressure was high during the first half of the month, with low temperatures; and it was low during the second half, with a marked disturbance over the British Isles from April 17 to 19, inclusive, and from April 27 to 30, inclusive. Over southern and eastern Europe conditions were reversed until the last four days of the month, when low pressure covered the entire continent.

Over Asia the pressure distribution was very similar to that over northwestern Europe. The low-pressure period was accompanied by mild spring-like weather that broke up the ice in the rivers and melted the snows, causing floods that were reported to have done great damage. Over the Sandwich Islands pressure was below the normal until the last day of the month.

Generally speaking, the most interesting feature of the weather of the month over the Northern Hemisphere was the unusual storm activity on April 19 and 20. On the morning of April 20 six severe storms were charted, one over the Japan Sea, one over Alaska, one off the coast of New Jersey, one off the Newfoundland Banks, one over the British Isles, and one over central Siberia. The high areas between the storms were relatively unimportant.

At the beginning of the month pressure was moderately high over the interior portion of the United States east of the Rocky Mountains, and low temperatures were general. West of the mountains pressure was falling and a low area of good proportions was moving down the eastern slope. By the morning of April 3 it had reached northeastern Texas, from whence it turned northeastward, with increasing intensity and velocity of movement, and during the night of April 5-6 it passed to the northeastward of Lake Superior. In the meantime pressure had become low over the entire country, and a second storm

had moved down the eastern slope to eastern Colorado. This storm was similar in character to the preceding one; but it moved more nearly eastward after reaching Colorado and with greater speed, passing over the Gulf of St. Lawrence during April 7. At the same time a high area appeared on the north Pacific coast. The two storms were accompanied by general precipitation that set in during Sunday, April 2, over the Ohio and upper Mississippi Valleys and the Southwest, and on the evening of April 4 the weather chart showed that precipitation had occurred over practically the entire country during the preceding 24 hours. Heavy rains fell in the Gulf States and Tennessee, there were snows from the upper Lake region westward to the mountains, and severe local storms did much damage in the central valleys and the South. The heavy rains in the South caused rapid rises to set in over all the rivers of that section, and the issue of flood warnings began on April 5. Mention of these floods will be made in the report on Rivers and Floods.

The precipitation area gradually contracted after the passage of the second storm, and pressure became moderately high over the northern half of the country. In the meantime, however, the barometer had fallen over the Southwest, and a slight secondary disturbance had formed in the South. This disturbance moved northeastward and caused more general rains from Texas northeastward into Pennsylvania on April 8 and snows in New York and New England. High winds attended the two principal storms after they reached the Mississippi Valley; and storm warnings were ordered for the Gulf and Atlantic coasts, beginning with the Texas coast on April 3. Temperatures were high in the South; but elsewhere cold weather continued, with temperatures below the freezing point as a rule, although temporary marked rises preceded the eastward movement of the two storms.

On Sunday, April 2, the following bulletin was issued:

The week will open with snows over the Northwest and snows and rains over the great central valleys and the upper Lake region, extending by Monday night into the lower Lake region and during Monday night or Tuesday into the middle Atlantic States and New England. The weather will also be unsettled Monday in the Southwest, with showers that will probably extend by Tuesday into the middle Gulf States. No precipitation of consequence is indicated for the South Atlantic States. Fair weather will prevail after Wednesday over the eastern portion of the country, and in the West it will be generally fair after Tuesday.

An extensive area of high pressure, with temperatures ranging from 24° to 30° below zero, covers Alaska, indicating that temperatures during the coming week will continue low for the season over the greater portion of the country, except probably the South Atlantic States, where they will be nearly normal. There will, however, be a temporary moderation over the East, attending the progress of the disturbance now over the West.

This forecast was generally verified except as to the Atlantic States and the Ohio Valley, where rains and snows occurred during the latter days of the week from the secondary disturbance noted above.

The high area that appeared on the north Pacific coast on April 7 spread to the eastward with increasing magnitude, and by the morning of Sunday, April 9, covered the entire district east of the Rocky Mountains, with its crest, 30.54 inches, over Lake Michigan. On this date, also, pressure fell rapidly over the Rocky Mountains and the Northwest, with rains in the Pacific States and along the western slope of the Rocky Mountains, and another storm was central near the extreme north Pacific coast,

for which warnings were at once ordered. The following bulletin was issued:

Fair weather will continue Monday east of the Rocky Mountains, and on Tuesday in the lower Lake region, the middle Atlantic States and New England. Low temperatures will continue Monday in the Atlantic States with freezing temperatures Monday morning over the northern sections, and frosts over the southern as far down as North Carolina.

A marked depression that is now central over extreme western British Columbia will move eastward and southeastward, reaching the upper Mississippi Valley by Tuesday night, the Lake region by Wednesday, and the Middle Atlantic States and New England by Thursday. Rising temperature will precede and accompany this disturbance, and it will also be attended by rains over the central and northern portions of the country. In the South fair weather will predominate, although there is some probability of showers about the middle of the week in the West Gulf States. A strong high pressure area from Alaska will follow the northwestern disturbance, and it will be accompanied by clearing and colder weather that will reach the Middle Atlantic States and New England by Thursday night or Friday. There are no present indications of a second storm during the week.

Floods will continue in the Tennessee River below Chattanooga, Tenn., for several days.

On the following morning the weather was clear and cool from the Mississippi Valley eastward and the anticipated frosts occurred in North Carolina. In the Plains States pressure continued to fall with fair weather and rising temperature, while in the far West rising pressure was accompanied by local rains and falling temperature.

The eastward movement of the western low-pressure area was effectually retarded by the steady upbuilding of the high area over the East, 30.75 inches over Maine on the morning of April 12, and after reaching Kansas it was deflected almost due northward, passing over Manitoba on the morning of April 13, and leaving a long and narrow trough to the southeastward. Local rains and snows continued in the West until the storm center passed over Manitoba, and general rains set in over the great central valleys and the South during April 11, extending through the Lake region on April 12, but not reaching the Middle Atlantic States and New England until April 14, by which time the northeastern high area had given way and the weather had cleared in the Lake region and the central valleys. Severe local storms occurred on April 12 over the eastern portions of Kansas and Oklahoma, and in Arkansas and Louisiana, causing considerable loss of life and great property damage. During the afternoon of April 13 a severe hail and wind storm visited the northern and eastern portions of the city of St. Louis, Mo., resulting in two deaths and the destruction of property to the value of about \$1,500,000. High winds occurred also generally over the States of the Central West and gales on the Great Lakes, for which storm warnings were ordered on April 12 and 13. One schooner was wrecked on Lake Michigan, with a loss of six lives.

The rains also caused a prolongation of the floods in the lower Tennessee and the Black Warrior and Tombigbee Rivers, with still higher stages, for which supplementary warnings were issued daily. Warnings were also issued for the Pearl River of Mississippi, the Wabash River, and the Ohio and Mississippi Rivers from Evansville, Ind., to Memphis, Tenn.

An offshoot from the main disturbance moved eastward from Manitoba over the extreme northern portion of the country from April 14 to 17, inclusive, causing a continuance of the unsettled weather in the Atlantic and Gulf States, with rains and snows, the latter in New York and New England, that did not cease until April 15 and 16.

Temperatures rose somewhat with the occurrence of the rains, although they remained below the seasonal average in the Middle Atlantic States and New England until

April 14, when there was a decided, though brief, rise. The cool wave that set in over the extreme West on April 9 moved eastward in the rear of the disturbance then over Utah, and by the evening of April 15 it had reached the Gulf and Atlantic coasts. Temperatures from 15° to 25° below the freezing point were experienced in the Plateau and northern Rocky Mountain regions from April 12 to 16, inclusive, and freezing temperatures on the north Pacific coast from April 12 to 15, inclusive. Warnings of the approach of these conditions were issued daily.

Pressure began to fall over Alaska on April 12, reaching the minimum on the morning of April 16, by which time an offshoot had reached Alberta without precipitation, but with higher temperatures that covered the Pacific States and the Plateau region. At the same time pressure began to rise on the north Pacific coast.

The pressure fall extended rapidly eastward and southeastward, reaching the Middle West in a long north and south trough by the evening of April 18, by which time rain had set in over the great central valleys. During the night of April 18-19 the southern section of the trough of depression disappeared and a single well-defined disturbance was central over the upper Mississippi Valley, with rain falling to the eastward except in the Atlantic States. The storm moved eastward with increasing intensity, and passed off the New Jersey coast during April 20, accompanied by general rains and high northeast to north winds for which warnings were ordered from Delaware Breakwater to Eastport. The storm was very severe in the Cape Cod district, but only a few minor casualties were reported, without loss of life. While the weather cleared in the West, a series of slight secondary disturbances over the upper Lakes and the Middle Atlantic States caused another rain period that did not terminate until the night of April 22-23. During this three-day rain period some snow fell over the northern districts, and in the northern and eastern portions of the State of Maine the total fall was considerable. Pressure rose rapidly in the rear of the secondary depressions, and by the morning of April 23 high pressure was general except over the extreme Southwest. Local rains persisted, however, in eastern Texas.

During the period from April 17 to 23, inclusive, temperatures continued low, except for a day or two preceding the low area in the Plains States and the upper Mississippi Valley. Frost warnings were issued daily, and frosts were of frequent occurrence, extending into Tennessee and North Carolina on the morning of April 23. In the plateau region the temperatures were often below the freezing point.

The following bulletin was issued on Sunday, April 23:

High pressure predominates over the Northern Hemisphere this morning, and is most marked over the United States. This distribution indicates that no warm weather may be expected over North America for several days at least. A moderate depression over the Southwest will cause showers during the early days of the week in the Gulf States and the lower Ohio Valley, but the principal disturbance of the week will probably reach the Pacific coast during Monday and Monday night. The disturbance will move eastward attended by rains that will reach the central valleys about the middle of the week and the Atlantic States by Thursday or Friday.

On the morning of April 24 high pressure was general with a crest of 30.62 inches over Lake Superior, and the weather was clear with low temperature, except in the Southwest, where cool northeast winds were attended by showers. Heavy frost occurred as far south as North Carolina, with repetitions on the two following mornings. On the morning of April 25 pressure had fallen considerably in the Southwest and extreme West, and by night there were pronounced storm centers over the British

Northwest and off the Texas coast. The latter storm gave promise of further rapid development and storm warnings were ordered on the Gulf coast from Pensacola, Fla., to Brownsville, Tex. On the morning of April 26 the storm was still off the Texas coast, and the storm warnings were extended to Tampa, Fla. They were also hoisted on the Atlantic coast from Jacksonville, Fla., to Charleston, S. C. This storm apparently developed in the pocket off the east Texas coast. It moved eastward with increasing intensity until the Louisiana coast was reached, when it turned north-northwestward with diminishing force, and finally dissipated over western Arkansas during April 27. During the passage of the storm the rainfall over the southern portions of Texas and Louisiana was torrential, and the high winds and tides did much damage along the middle Gulf coast. Several small craft were wrecked in the vicinity of Gulfport, Miss., and railroad traffic along the coast was entirely interrupted for a time. The highest wind appears to have occurred at Pensacola, where the maximum velocity was 68 miles an hour from the east during the night of April 26-27. The storm center was some distance to the westward of Pensacola but an extensive high area to the northeastward caused the tide to rise 2 feet above the normal height. The steamer *Belle* went to pieces and the captain, engineer, and two children were drowned. Several small craft were also wrecked.

The northwestern storm moved southeastward to Colorado accompanied by light local rains and snows, and during the night of April 28-29 turned to the eastward, but with a decided pressure fall to the southward also. Rains had set in over the central valleys and the Lake region, and by the morning of April 30 a broad trough of low pressure extended from the west Gulf States northeastward through the Lake region with a principal center of depression, 29.50 inches, over northwestern Missouri. A high area was following from the Northwest accompanied by falling temperature, and by some snow in South Dakota, northwestern Nebraska, southeastern Wyoming, and eastern Colorado. On the evening of April 30 the principal storm center was over Iowa, with a secondary one over Ontario, and rains had commenced in the Atlantic States. As there were indications of further development of the Iowa disturbance, northeast storm warnings were ordered for Lakes Superior, Michigan, and northern Huron. Warnings for freezing temperatures to follow the storm were issued on both April 29 and 30.

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since Jan. 1.	Average departures since Jan. 1.
New England.....	12	42.3	-1.4	- 2.3	-0.6
Middle Atlantic.....	15	48.7	-1.8	+ 0.2	0.0
South Atlantic.....	10	60.9	-0.4	+ 7.9	+2.0
Florida Peninsula*.....	7	72.5	+2.4	+11.5	+2.9
East Gulf.....	11	65.6	+1.0	+16.3	+4.1
West Gulf.....	10	65.0	-0.5	+18.4	+4.6
Ohio Valley and Tennessee.....	13	53.4	-1.6	+10.0	+2.5
Lower Lakes.....	10	44.4	-0.4	+ 4.6	+1.2
Upper Lakes.....	12	41.1	+0.8	+11.9	+3.0
North Dakota*.....	9	41.1	+0.4	+ 2.8	+0.7
Upper Mississippi Valley.....	14	48.8	-1.6	+12.9	+3.2
Missouri Valley.....	12	50.0	-0.5	+17.6	+4.4
Northern slope.....	9	41.9	-0.9	+ 6.8	+1.7
Middle slope.....	6	53.6	-0.2	+15.8	+4.0
Southern slope*.....	8	61.2	-0.3	+16.6	+4.2
Southern Plateau*.....	10	57.9	-0.6	+ 5.4	+1.4
Middle Plateau*.....	10	45.9	-1.4	+ 6.3	+1.6
Northern Plateau*.....	11	45.5	-1.6	+ 0.5	+0.1
North Pacific.....	7	45.3	-3.1	- 4.9	-1.2
Middle Pacific.....	5	53.7	-1.7	- 2.8	-0.7
South Pacific.....	4	57.5	-0.6	+ 2.1	+0.5

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
New England.....	11	2.80	93	-0.2	-2.0
Middle Atlantic.....	15	4.87	73	-1.8	-4.1
South Atlantic.....	11	1.16	47	-1.3	-8.1
Florida Peninsula*.....	7	1.09	48	-1.2	-7.0
East Gulf.....	11	6.72	209	+3.5	-3.5
West Gulf.....	10	6.47	159	+2.4	-1.0
Ohio Valley and Tennessee.....	13	6.55	179	+2.9	0.0
Lower Lakes.....	10	2.51	109	+0.2	-0.4
Upper Lakes.....	12	2.12	91	-0.2	-1.2
North Dakota*.....	9	1.58	90	-0.2	-0.1
Upper Mississippi Valley.....	15	3.83	122	+0.7	-0.1
Missouri Valley.....	12	2.94	97	-0.1	-0.1
Northern slope.....	9	1.25	76	-0.4	-0.7
Middle slope.....	6	1.69	74	-0.6	-0.8
Southern slope*.....	8	2.36	104	+0.1	+0.6
Southern Plateau*.....	10	0.34	63	-0.2	+1.0
Middle Plateau*.....	11	0.77	72	-0.3	+0.7
Northern Plateau*.....	11	0.68	58	-0.5	-2.3
North Pacific.....	7	2.05	63	-1.2	-8.1
Middle Pacific.....	7	1.27	61	-0.8	+4.1
South Pacific.....	4	0.82	80	-0.2	+7.9

Average relative humidity and departure from the normal.

Districts.	Average.	Departure.	Districts.	Average.	Departure.
New England.....	68	- 5	Missouri Valley.....	63	- 2
Middle Atlantic.....	69	+ 2	Northern slope.....	60	+ 2
South Atlantic.....	74	+ 2	Middle slope.....	56	- 1
Florida Peninsula.....	76	+ 2	Southern slope.....	60	+ 5
East Gulf.....	74	+ 4	Southern Plateau.....	42	+12
West Gulf.....	77	+ 5	Middle Plateau.....	47	+ 2
Ohio Valley and Tennessee.....	69	+ 4	Northern Plateau.....	49	- 8
Lower Lakes.....	69	- 1	North Pacific.....	74	+ 3
Upper Lakes.....	72	- 1	Middle Pacific.....	70	- 2
North Dakota.....	67	- 1	South Pacific.....	70	+ 2
Upper Mississippi Valley.....	69	+ 1			

Average cloudiness and departure from the normal.

Districts.	Average.	Departure.	Districts.	Average.	Departure.
New England.....	4.7	-0.8	Missouri Valley.....	5.3	-0.3
Middle Atlantic.....	5.8	+0.6	Northern slope.....	5.1	0.0
South Atlantic.....	5.6	+1.0	Middle slope.....	4.7	+0.1
Florida Peninsula.....	4.1	+0.6	Southern slope.....	5.7	+1.0
East Gulf.....	6.0	+1.1	Southern Plateau.....	2.9	+0.1
West Gulf.....	6.3	+1.2	Middle Plateau.....	4.1	-0.4
Ohio Valley and Tennessee.....	6.3	+1.0	Northern Plateau.....	4.7	-0.5
Lower Lakes.....	5.4	-0.3	North Pacific.....	5.4	-0.8
Upper Lakes.....	5.5	0.0	Middle Pacific.....	4.3	-0.1
North Dakota.....	4.5	-0.8	South Pacific.....	4.2	-0.2
Upper Mississippi Valley.....	6.3	+1.1			

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Ablene, Tex.....	22	53	nw.	North Head, Wash....	8	60	se.
Block Island, R. I.....	21	61	ne.	Do.....	9	71	se.
Columbus, Ohio.....	16	60	w.	Do.....	10	66	se.
Detroit, Mich.....	6	50	w.	Pensacola, Fla.....	5	52	se.
Do.....	16	52	w.	Do.....	11	52	nw.
Duluth, Minn.....	13	54	sw.	Do.....	26	68	e.
El Paso, Tex.....	2	59	w.	Do.....	27	66	e.
Fort Smith, Ark.....	4	50	sw.	Pittsburg, Pa.....	15	56	nw.
Galveston, Tex.....	26	50	e.	Point Reyes Light, Cal.....	1	56	nw.
Do.....	26	54	ne.	Do.....	5	64	s.
Kansas City, Mo.....	13	51	sw.	Do.....	11	53	nw.
Lexington, Ky.....	4	58	s.	Do.....	12	68	nw.
Do.....	19	64	w.	Do.....	17	53	nw.
Lincoln, Nebr.....	12	54	nw.	Do.....	18	77	nw.
Minneapolis, Minn.....	12	50	se.	Do.....	27	51	nw.
Modena, Utah.....	5	50	sw.	Do.....	12	73	nw.
Mount Tamalpais, Cal.....	12	55	nw.	Do.....	30	59	n.
Do.....	15	54	nw.	Do.....	12	53	nw.
Do.....	17	53	nw.	S. E. Farallon, Cal.....	18	55	nw.
Do.....	18	86	nw.	Do.....	5	57	sw.
Nantucket, Mass.....	5	52	se.	Do.....	6	53	sw.
Do.....	20	70	ne.				
Nashville, Tenn.....	4	62	se.				